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Diesel truck
drivers handbook

DIESEL TRUCK
Drivers Handbook

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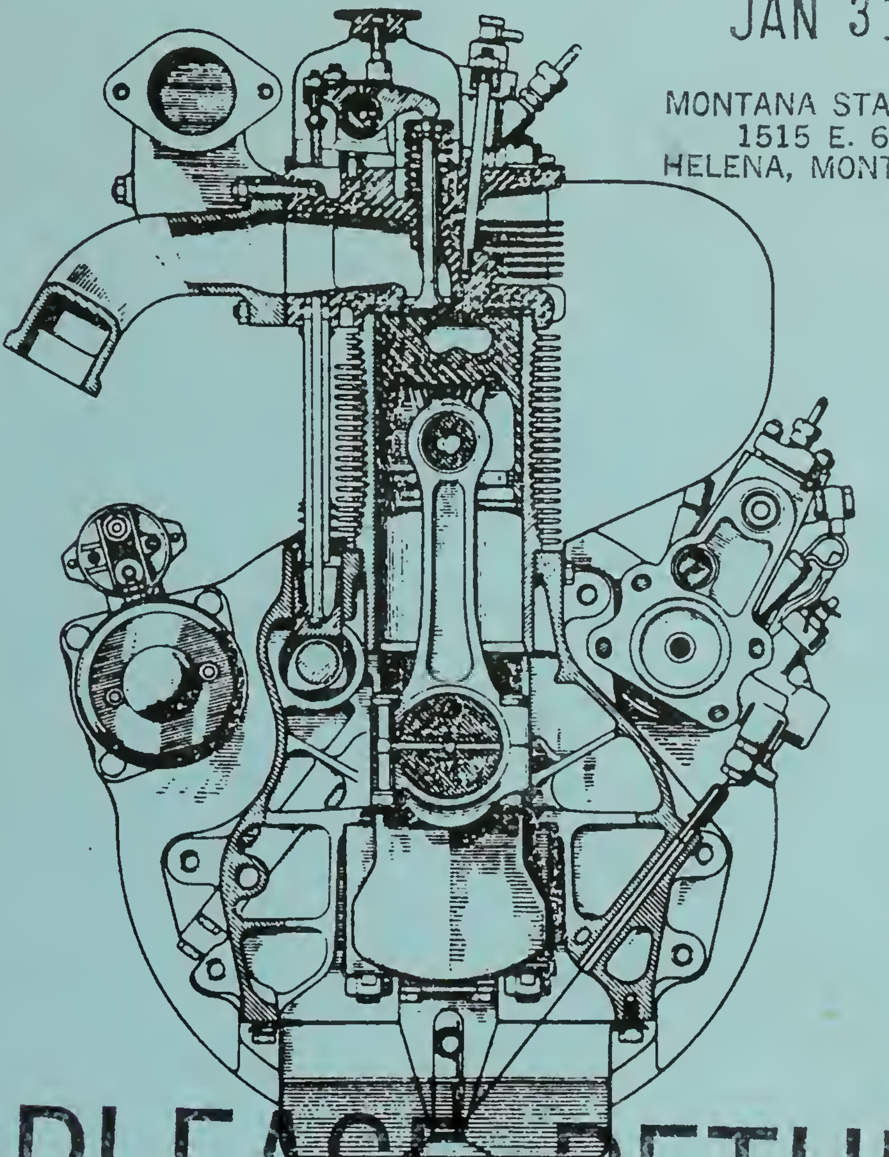

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DIESEL TRUCK
Drivers Handbook
Montana Department of Highways

June 1985

Roy Symons - Training Officer
Maintenance & Equipment Division

GASOLINE TO DIESEL

The Department of Highways' change from gasoline to diesel trucks has created a situation where many very capable department employees need retraining. While many of you have experience with other diesel powered equipment, the differences in the transmissions used in trucks requires more practice on the operators part to make this transition.

Changing from gasoline to diesel powered vehicles requires practice on the drivers part to make the change. The two types of engines perform much the same in a vehicle. The difference in sound will be very noticeable, diesels operate at a lower rpm, primarily due to the difference in the ignition process. Diesels provide greater fuel efficiency and more torque power.

IGNITION - Spark vs. Compression

Gasoline engines ignite a fuel, air mixture with an electrical spark. Diesel engines operate on the principle of compression ignition. As the air is compressed it generates heat at about a 10 or 12 to 1 compression ratio this heat is enough to ignite fuel injected into the cylinder.

TURBOCHARGER

The majority of diesel engines presently used in equipment are turbocharged. The turbo charger is driven at very high speeds by the waste heat of the exhaust system, and delivers combustion air to the engine. The high speed turbo charger is pressure lubricated by the engine lube system. Turbochargers rotate at many times the engine speed and produce tremendous heat. This heat and speed demand special start-up and shut-down considerations.

Follow normal starting procedure for the make or model truck you are driving. After starting run the engine at low idle for two

minutes to allow adequate lubrication of the turbo. Then increase the idle to 1000 RPM and check the oil pressure. When all systems are up to operating levels, the engine is ready to work.
(NOTE: Avoid full throttle until engine coolant temperature reaches 140° F.)

Turbocharged diesel engines require long cool down periods. Park the truck on a smooth level surface, set the parking brake and place the transmission in the neutral position. Set a low idle for three minutes. This allows excess heat to be removed from the engine and turbo-charger gradually and continues to lubricate the turbo. This would be a good time to perform your post operation walkaround and finish your paperwork. After three minutes, if all gauges indicate proper levels the engine can be safely shutdown.

During operation some turbos reach speeds in excess of 25,000 RPM and take longer to slow down than an engine running at 2000 RPM.

The engine oil system lubricates the turbo and aids in cooling it. To shut down a hot engine and thus the turbo's lubrication is applying unnecessary abuse to the unit and could cause premature failure of the unit.

DIESEL POWER

Modern diesel engines are governed at 1900 to 2100 RPM, but generate peak torque at 1300 to 1500 RPM. This means that the engine does not need to be rapped up to governed speed to shift. In fact, over-reving these engines is wasting fuel and causing unnecessary engine wear. Picking up the next higher gear as soon as a high enough RPM is reached without rapping the engine to governed speed is called progressive shifting and is possible with a little practice to develop familiarity with diesel engines. A diesel can be pushed over governed speed in a "no-load" condition (the clutch depressed and transmission in neutral), or on a downgrade.

The engine operating range is the RPM range at which the engine performs effectively under a load. This range extends from the point of peak torque at the low end to full load governed speed at the high end. Within the operating range the low and mid speed range will result in good fuel economy and the high speed range will produce maximum power.

ENGINE SPEED

Engine speed or revolutions per minute (RPM) is read on the tachometer. Refer to tach often as you drive it will be valuable as a gauge when driving for economy, shifting on grades and a guard against over speeding the engine. Conserve RPMs by matching appropriate engine speeds to load requirements and road speed. Modern diesel engines operate efficiently at low and middle speed ranges with definite fuel saving. To run in a low gear at top RPM in a 25 MPH zone is wasting fuel and is unnecessarily noisy.

POSITIVE GRADES

The engine works hardest when pulling a load on a positive grade. Proper gear selection and technique will minimize the time and shifting on the grade.

When you approach a hill, depress the accelerator and keep it depressed on up the grade. If there is enough power to keep up your speed remain in that gear up the grade.

If the grade is causing loss of RPM, downshift when road speed reaches the shift point for the next lower gear. Continue to downshift to match the power demands for the grade.

Staying in each gear until the next lower shift speed, you will pull the grade in the best time and use less fuel and fewer shifts.

GEARS

When driving conditions permit, maintain highway speeds in a gear that permits running the engine 10% to 20% below governed speed. This cruising range enhances fuel economy, reduces shifts and maintains a power reserve.

When driving in town, operate in a high gear at reduced RPM to hold the legal speed. Reducing engine speed conserves fuel and lowers noise levels. When slowing down for posted speed zones along your highway route, stay in your running gear and reduce RPM to get within the speed limit. Downshift when you are ready to regain highway speed.

ROLL BACK

Starting a load on a positive grade without any roll back can be difficult. The following procedure, with a little practice can make you look like a real pro:

- Set the parking brake

- Disengage the clutch
- Shift to low gear
- Bring the RPM up and begin to engage the clutch
- When you feel a load on the clutch release the parking brake
- When the RPM falls DO NOT disengage the clutch
- Hold your throttle and the RPM will recover

SHIFT POINTS

Knowing the shift point rather than guessing at them can greatly improve a drivers skill. The shift points can be determined by a road test, for the maximum road speed in each gear at governed speed. By knowing this information you can avoid overspeeding the engine by downshifting too soon or missing a gear by downshifting too late. These shift points are guides, post them on the dash for reference until you learn them for each individual vehicle.

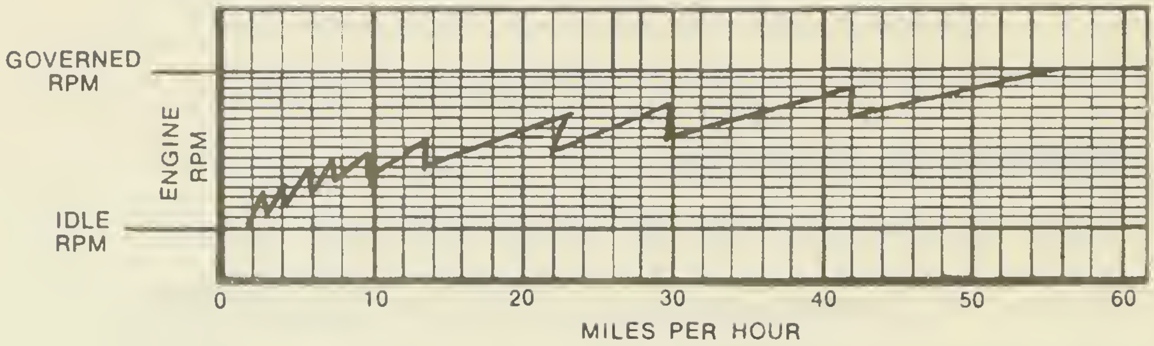
MPH													
GEAR													

PROGRESSIVE SHIFTING

It is not necessary to push the engine to governed speed in the lower gears, except in situations demanding high power (starting on a positive grade). Conserve engine RPM and you conserve fuel. Keep the engine speed at the actual need and you conserve fuel plus maintain a power reserve.

Start the vehicle in low gear. Accelerate to an engine speed where the shift can be made and the vehicle will accelerate in the new gear.

Each successive shift should be at a higher engine speed. The RPM where the shift can and should take place depends on several factors; load, grade, transmission, axle ratios and horsepower. This technique is called "progressive shifting" and will get you to cruising speed and reduce noise and emissions while increasing fuel economy.



IDLING

Prolonged idling damages an engine thus reducing the functional life of that engine. Unburned fuel washes lubricants from the cylinder walls and forms deposits that accelerate wear. If you are going to leave the cab or stop for more than normal cool-down time, shut the engine off.

If the operation is such that prolonged idling cannot be avoided, try to maintain a fast idle of at least 1000 RPM.

Cold weather and cab heat are major temptations for long idle periods. Actually an idling engine cools down faster than if it is shut down. If your cab heating system depends on the engine cooling system for heat, that accelerates the cooling.

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